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POINTS OF VIEW

Why include the humanities in medical studies?

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Abstract
The relation between philosophy and biomedicine has been reassessed and rethought in the last few years: on the one hand, philosophy of science has paid increasing attention to actual modes of biomedical research and clinical practice; on the other, classes in philosophy, and more generally, in the humanities, have started entering medical curricula. However, the role of philosophy in medical education is not yet unanimously recognized, with situations differing significantly in various national and international contexts. In line with the tradition in Italy and other countries of reflecting on clinical methodology and with the recent initiatives at the crossroads between medicine and philosophy, this contribution aims to argue for the mutual relevance of medicine and philosophy in educational processes, and to suggest some possible forms of implementation of their interactions.

Keywords Philosophy of science for medicine · Medical humanities · Medical curricula

Some historical and theoretical background

In the last few years, relations between philosophy and the sciences have been reassessed and rethought, with philosophy of science paying increasing attention to *actual modes* of biomedical research and clinical practice, conceptual challenges and methodological innovations. Many contacts and exchanges have developed between philosophy and the sciences in the context of philosophy of the biomedical sciences. Biomedicine offers a wide range of highly interesting, and often thorny, theoretical issues, concerning—to mention but a few—definitions and classifications of diseases; the collection and evaluation of evidence; and relations between biomedical research and clinical practice. These issues have stimulated revision of several core philosophy of science notions, such as scientific theory, law, model, …, prompting a broad array of conferences, volumes, and academic articles. This has happened in a wider scenario in which the medical humanities have encountered large success, expressed also through devoted journals, such as the *Journal of Medical Humanities* and *Medical Humanities*, and books [1, 2]. As clearly expressed in the title of a recent conference held in Bologna, "Clinical medicine: back to humanities?" (26–27 October 2018), organized by two of the authors,[1] increasing consent is being built around the idea that the time has come to rebuild bridges between the humanities and medicine.

Although the success and extension of philosophy of biomedicine are unprecedented in terms of the number of scholars involved and research activities on-going, it is by no means a completely new field. There is a long tradition, especially in Italy, of philosophical reflection on clinical methodology and theoretical insights into clinical practice. It is a tradition that still deserves serious historical analysis that should be made available to an international audience. Key scholars include Maurizio Bufalini (1785–1867), who was followed by Augusto Murri (1841–1932), Giacinto Viola (1870–1943), Enrico Poli (1909–1997), Giuseppe Giunchi (1915–1987), Mario Austoni (1912–2007), Cesare Scandellari (1933), Giovanni Federspil (1938–2010), Paolo Raineri (1931–2017), Dario Antiseri (1940), and Massimo Baldini (1947–2008).

[1] The conference was organized by Prof. Sergio Coccheri and Prof. Giovanni Boniolo.

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Their contributions should not be considered as belonging to some distant past, nor as optional background knowledge. On the contrary, their work is particularly up-to-date, given the lively international debate that has re-opened many questions concerning the relationship between biomedicine and philosophy of science and bioethics. An array of positions is advocated. Different authors have claimed, e.g., that the role of philosophy of science should be:

- simply methodological;
- clarificatory;
- proactive, spurring science towards new goals;
- particularly attentive to the features of science *in practice*.

Whatever the main role purported for philosophy, today reflections flourish on the mutual relations between real science and philosophy of science, the possible dyscrasia between them, and, more generally, the actual interactions between the medical humanities and medicine, their modes of integration, and effects on education [3, 4].

We believe that relationships between biomedicine and philosophy should not be investigated exclusively at the theoretical level but also in terms of their possible practical and educational impact, tackling the role to be played by philosophers in the training of both medical researchers and clinicians and its impact in the long run. If we claim that the humanities and, more specifically, some philosophical education are to be part of scientific curricula, and that innovative training is likely to lead to better research at later career stages, then we must also be ready to design interesting curricula that are compatible with existing curricular rules and constraints. This interdisciplinary exercise should be evaluated not only per se, but also measured with respect to the benefits it could provide to the disciplines involved [5].

What follows discusses modes of implementing humanistic and philosophical training in biomedicine curricula, with a specific emphasis on the importance of conceptual awareness and responsibility in the use of theoretical tools. Given the complexity of issues arising in the biomedical sciences, *medical humanities* should not be limited to providing medical students with some knowledge of, e.g., literature or art, but should equip them with the proper conceptual—i.e. methodological, epistemological and ethical—background to face the important new challenges that contemporary medicine continues to present ([6]. On a proper understanding of evidence and reversal in medicine, see [7]). We would like to stress here how, within the medical humanities, philosophy of science and ethics can offer the proper lenses to make explicit what is often left implicit in the construction of medical knowledge, and to tackle the frequent shifts of paradigms in biomedicine. Bringing to light assumptions, meanings, interpretations, and consequences of methodological, conceptual and decisional choices, we can make sure that the "threshold of awareness" ([8], p. S9) is kept high.

Humanities for medical training

R. Smith, former editor of *The BMJ*, strenuously claimed that "healthcare, which is suffering an existential crisis, badly needs the help of philosophers" [9]. This sentiment is shared by an increasing number of biomedical scientists and clinicians who are asking for more ethics, more philosophy of science and more methodology of science in the training of the young generations. A. Casadevall [10] can be taken as a paradigmatic exemplar of philosophically interested scientists, with his strong support of putting "the 'Ph' back into 'PhD' ", i.e., Philosophy into a *Philosophiae Doctor* programme. In turn, philosophy includes a range of different approaches and vantage points. Let us focus on the ones that we believe should most urgently be included in medical curricula.

Why should ethics be included and/or improved?

On the one hand, awareness in the medical field of the need for more integrity among researchers and clinicians is increasing, as witnessed by the growing number of reports of scientific fraud, misconduct [11, 12], and retractions connected with un-ethical behaviour [13, 14]. On the other hand, the impressive progress in research, especially in biotechnology and precision medicine, demands new tools for ethical analysis [15–17]. Furthermore, clarification is needed on what constitutes conflict of interest, both at the research and clinical level. All this requires a medical student to be exposed to ethical issues from the very beginning of her/his career. Without any intent to transform the science student into an expert ethicist, educational programmes should make sure that she/he becomes familiar with the main theoretical tools for ethical analysis to be able to orient accordingly her/his evaluations and actions. This will also foster greater awareness of the societal consequences that ethically valued conducts have.

Why should methodology of science be included and/or improved?

Galilean science, i.e., our science for at least four centuries, is based on the disclosure of data and empirical procedures, which allow the replicability and the reproducibility of outcomes. Without the transparent disclosure of data and empirical procedures, and without the replicability and reproducibility of empirical results, science as we know it would no longer exist. Far from being obvious, this is an extremely

serious point, not only for science and scientists, but for the whole of society, since neglecting the foundational features of science would have severe consequences on diagnostic tools and therapeutic treatments. The irreproducibility of scientific results is such a well perceived issue that we are witnessing the birth of new funding agencies devoted to the replication of scientific results [18, 19]. Without clear methodological tenets, science could hardly be separated from magic, and serious and scientifically validated medical treatments would be impossible to distinguish from dangerous or absolutely ineffective ones. Yet while no one is expecting medical students to be turned into experts of methodology, they are supposed to have some informed basic knowledge of methodology and some understanding of what their daily job in a lab or in a ward should be.

Why philosophy of science?

Philosophy of science competence would help avoid reasoning fallacies, which jeopardize interpretations of scientific results and clinical tests. For example, the fallacy of inferring positive conclusions from negative data, the fallacy of the affirmation of the consequent, the fallacy of false generalization, and the confusion between a statistical correlation and a causal correlation are extremely common. Philosophical awareness of correct argumentation would improve appropriate reasoning in the research environment and in the clinic—where wrong reasoning can have devastating effects on patients' lives. Philosophical competence would provide a correct understanding of reasoning, argumentation and the theoretical foundations of probability and statistics. For instance, recent literature clearly shows that there is no clear and widespread idea of what a *p* value is, what its connection with a confidence interval is, what scientific/clinical relevance is, etc.[20] Lack of adequate knowledge of the foundations of probability and statistics, incorrect understanding of what a survival rate can tell us, or of differences between sensitivity and specificity of a test, or positive and negative predictive values, affect not only the research domain but also the clinical sphere. The medical student is asked to know that reasoning—be it probabilistic or not—has its own rules—coded down the millennia—and that there are many conceptual issues underlying the statistical software she or he is using and the protocols she or he is adopting. A correct understanding of all these aspects is not an intellectual luxury but a necessity to properly understand the results of a clinical test, experiment, and clinical trial. Given that it constitutes the grounding on which clinical decisions are then taken, correct understanding of observational and experimental evidence, how it is obtained and how it should be used is not just a theoretical exercise but a moral duty as well. In this sense too, epistemology and ethics are closely intertwined.

Constructive engagement with the education of the future generations of biomedical scientists and clinicians is the key to preserving the genuine status of science—demanded by scientists and clinicians themselves—and to promoting a truly person-centred medicine. The usual curricula of bioscientific programmes and medical schools could be devised accordingly, including ethics, philosophy and methodology of science. Providing future researchers and clinicians with some competence also in these issues is the best way to safeguard science as we know it and shield it from fake science and pseudo-science.

The Ferrara model

Starting from the thoughts above, the University of Ferrara (Italy)—one of oldest universities in the world (1391)—reorganized the training of medical students after a fruitful discussion with colleagues from clinics and labs[2]. Since 2016, the students at the medical school receive a humanistic education, in parallel with their usual biomedical and clinical training. In particular, in the first year, a course called *Medical humanities* is established, composed of four modules:

- *Legal medicine* (16 h), on the basic legal notions of clinical practice;
- *Clinical psychology* (8 h), providing a first view on the doctor–patient relationship;
- *History of medicine* (8 h), on the historical development of some key aspects of medical practice;
- *Clinical critical thinking and clinical ethics* (32 h) on how to correctly infer and argue, and the fallacies to be avoided; how to write a paper and defend a thesis; what the scientific method is, the epistemological role of empirical results, how to construct a good ethical position, and how to cope with ethical problems, etc.

In the third year, students have to attend *Diagnostic methodology* (25 h) focusing on the epistemological meaning of sensibility and sensitivity, positive and negative predictive values, ROC curve, etc., the *p* value, confidence interval, clinical relevance, type I and II errors, etc., Bayes theorem, the frequentist and Bayesian approaches, etc.

In the fifth year, they have *Ethics in practice* (16 h). A clinician (a nephrologist, gynaecologist or surgeon, etc.) presents a real clinical case which intersects an ethical/existential problem. Students then discuss it under the direction

[2] This re-organization was the work of one of the authors of this contribution, G.B. Special mention should also be made of the enthusiasm and hard work of T. Bellini, the E*ducational Dean of the Ferrara Medical School.*

of an ethical expert who frames it within the international debate. Note that beside the subjects implemented, the Ferrara Medical School places particular emphasis on the humanization of treatment and patient-centred medicine, with patients' needs at the centre of any clinical procedure. The Ferrara Medical School also pays appropriate attention to gender medicine and diversity issues, which are presented throughout the 6-year medical degree course.

The Ferrara model constitutes a serious attempt to constructively prepare students (i.e., future researchers and clinicians) to develop a sensitivity for ethical issues and the philosophical aspects of their work. Certainly, it is not the only approach. But it could offer an example of how the humanities can be effectively and efficaciously included in the medical curricula to raise awareness among new generations of researchers and clinicians that a patient is an individual with a story, a biography, a set of values, beliefs, fears and hopes. Medical training modified along these lines lays the ground for a better perception of biomedicine, how it should be practised and what challenges its future developments might ask us to address. The ultimate aim is to improve the quality of life of actual and future patients, ensuring that the final goal of medicine—to cure if possible, but to care always—is constantly pursued. Ultimately, the specific spirit of the Ferrara model can be summarised in four features: it is to provide a *joint* ethical, methodological and philosophical education, to be delivered *in an integrated way* as a *compulsory* component of the basic training *for all doctors* to be.

Concluding remarks: prospects for implementation of cross-disciplinary training

The novel training and educational project described above has been made possible by a range of favourable conditions:

- a specific scientific context,
- cooperative relations,
- a strong commitment to interdisciplinary exchange between colleagues in Medicine and Philosophy.

We are encouraged to reconsider possible interactions between philosophy and the sciences, and, together, current educational curricula. A consensus on the importance of some philosophical training for scientists must go hand in hand with reflections on the structure and organization of higher education and early career processes, to be developed by answering a few questions:

- Would present curricula in medicine actually allow for the inclusion of philosophical views, and vice versa?
- How deeply would they have to be re-structured?
- Are some curricula in education worldwide more favourable than others in this respect?
- Could some useful lessons be drawn by systematically comparing results—e.g. joint works in the sciences and humanities—obtained within different educational and training systems?
- Should more scientific knowledge be included in philosophical curricula to educate philosophers who subsequently will be able to properly interact with medical doctors and medical students?

Another aspect not be neglected has to do with early careers and academic frameworks. Usually, it is the person with an established position within a scientific community who makes the effort to acquire knowledge in a different disciplinary field. If philosophical interests in the sciences or scientific interests in the humanities are not to be a sort of "late career addendum", on the decorative edges of a curriculum, but rather part and parcel of standard training, then some proper recognition of trans-disciplinary studies should be warranted from the start. For example, trans-disciplinary studies should be an advantage for those applying for grants, fellowships and early career research projects where ethical awareness and conceptual competence could make a difference.

Learning how knowledge comes about must be one of the first targets when approaching a field, and taking care of educational processes is pivotal to reaching such a target. Actual experiences across disciplines, sharp and focused interventions on curricula, rather than theoretical, scholarly reflections, prove effective means of creating philosophically aware scientists. We believe that:

1. the focus should not be just on interdisciplinary results of research per se, but also on the benefits exchanges between different disciplines can have *within* each single field;
2. rather than being prioritized hierarchically, organizational, institutional, educational, cognitive and epistemological aspects should be addressed *together*;
3. in addition, and as a further step in the process of re-approaching medicine and the humanities, addressing philosophical training for bioscientists and clinicians and, at the same time, scientific training for philosophers as two sides of the same coin is likely to be a very fruitful way of shedding light on how knowledge comes about in both fields.

Ways must be devised to evaluate and, if possible, measure such benefits, in both the short and long run, so as to further orient implementation of intertwined reflections and training. Only by *jointly* considering research issues,

training initiatives, educational curricula and institutional and organizational conditions can we have a rethinking of the relation between philosophy and medicine which might have an impact on the future fate of both fields.

Compliance with ethical standards

Conflict of interest The authors, Proff. Giovanni Boniolo, Raffaella Campaner, and Sergio Coccheri, declare that they have no conflict of interest.

Statement of human and animal rights This article does not contain any studies with human participants or animals performed by any of the authors.

Informed consent For this type of study, no informed consent is required.

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